DOCUMENT RESUME

ED 087 620 SE 016 655

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TITLE A Pilot Science Curricula for Educable Mentally Handicapped Children Emphasizing Child-Centered Activities.
PUB DATE Apr 73
NOTE 11p.; Paper presented at the annual meeting of the National Science Teachers Association (21st, Detroit, March 30--April 3, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Curriculum Design; Curriculum Guides; Exceptional Child Education; *General Science; Instructional Materials; Logical Thinking; *Mentally Handicapped; Special Education; *Student Centered Curriculum

ABSTRACT

In this paper, discussion is provided concerning the development of a pilot science child-centered activities. Background information on the Riverview School of Manitowoc, Wisconsin, is given. The objectives aim at providing EMH children with a systematic approach to logical thinking, direct experiences, and opportunities to realize natural surroundings. The Elementary Science Study (ESS) material is considered appropriate for EMH children's use. Thinking processes such as observing, classifying, communicating, inferring, measuring, predicting, interpreting, making operational definitions, formulating questions and hypotheses, and experimenting are grouped into four levels and included in the content. Included are a list of the ESS units used and teachers' rating of the material. (CC)

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ED 087620

A PILOT SCIENCE CURRICULA FOR EDUCABLE MENTALLY HANDICAPPED CHILDREN EMPHASIZING CHILD-CENTERED ACTIVITIES

by

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Presented at

National Science Teachers Association
National Convention
Detroit, Michigan

April 2, 1973

SE 016 655

Acknowledgements

I would like to express my appreciation to the Manitowoc County Handicapped Children's Education Board and to Mr. Henry Donatell, Administrator of Riverview School, for their insight and encouragement to attempt innovative educational procedures with students. Appreciation is also extended to the curriculum committee itself consisting of Mr. Walter O'Connell, Intermediate Unit Leader; Miss Jamey Price, Transitional Unit Leader; Mrs. Sue Staniszewski, Lower Primary Unit Leader; and Mrs. Virginia Tutje, Upper Primary Unit Leader; for their dedication to the science project. A very special appreciation is extended to the entire staff at Riverview School for their cooperation and willingness to undertake the science project.

Appreciation is also extended to the staff of the Wisconsin Department of Public Instruction which provided consultant services to the science project. This staff included:

Dr. John Cook, Coordinator, Research Design and Administration

Dr. Kenneth W. Dowling, Science Consultant, Wisc. Dept. of Public Instruction

Mr. Kenneth McMahon, Instructional Media Specialist

Mr. Patrick Pflieger, Special Education Consultant, M.R.

Mr. Thomas Stockton, Curriculum Consultant, Title VI-B

Mr. John Stadtmueller, Program Administrator of Title VI-B, ESEA, Wisc. Dept. of Public Instruction

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Background - Riverview School

Riverview School is a central facility providing educational services for approximately 350 mentally handicapped children. The school, with its open concept design and multi-unit approach, provides educational services to a population of 20,000 students in grades K-12 from five participating school districts in Manitowoc County, Wisconsin. The school population includes chronological ages of 5 to 21 with approximately 270 children classified as educable mentally handicapped and approximately 80 children classified as trainable mentally handicapped.

The educable students have been referred to Riverview School from regular education classes throughout the county, and thus, come with varying chronological ages and differing curricula backgounds. The majority of these students will be transferred to special education programs at the secondary level in one of the three area high schools. Other students may be mainstreamed back to regular education classes at various chronological ages. Those students not mainstreamed to regular classes or transferred to secondary programs will remain at Riverview School until age 21 in a transitional program that stresses career preparation.

Science Proposal

In April of 1972, a science proposal was funded under Title VI-B of the Elementary and Secondary Education Act to develop a science curriculum for educable mentally handicapped children attending

Riverview School. The science curriculum was to provide the following.

1. A systematic approach to logical thinking for EMH children.
2. Child-centered activities emphasizing direct experiences.
3. Opportunities for EMH children to realize their natural surroundings to better succeed in aspects of life related to earning a living.
4. An opportunity for a critical reveiw and analysis of available instructional materials.

This curriculum would be field tested and evaluated throughout the 1972-73 school year and then be published for dissemination to EMH educators in the State of Wisconsin.

Summer Workshop

During the summer of 1972 a four-week workshop was held at the school to work on the science curriculum. The five participants in the workshop were the lower primary, upper primary, intermediate, junior high and transitional pod unit leaders. The participants reviewed the philosophy of Riverview School which states that the mentally handicapped individual, like his more able peers, is an integral part of society and therefore his education should discover and develop those abilities which will insure his worthy contribution and membership in that society. Permeating throughout this philosophy are the fundamental purposes of education for all children: self realization, human relationships, economic and civic responsibility.

The many different types of approaches and materials used in teaching science were reviewed with this philosophy in mind. Programs using textbook series were ruled out because of the reading problems that would be encountered by a majority of the students.

In attempting to overcome the reading problem, many special education teachers have resorted to a lecture type approach accompanied by such things as filmstrips and simple worksheets. Since the children tend to be passive participants in this type of approach, there is seldom any real interest or excitement demonstrated.

The contemporary science programs such as the American Association for Advancement of Science (AAAS), the Science Curriculum Improvement Study (SCIS), the Elementary Science Study (ESS), and the Biological Science Curriculum Study (BSCS), were reviewed for their appropriateness for use with EMH children. For the most part, these programs provided activity-centered units that required little if any reading, and the materials appeared to be adaptable for educable children. However, getting educable children interested in science by being actively involved with the materials would be just the beginning.

It was also noted in the literature and in discussions with other teachers that many students were not able to use the scientific method to attack new problems. Students were more capable of reciting back exact facts and answers which were presented to them. Therefore, it seemed that more attention should be directed toward the processes or methods of seeking answers rather than over emphasizing the finding of exact answers that would probably be soon forgotten. This would apply not only in science but in problems that arise in all aspects of daily living for the educable youngster and adult.

Therefore, the science program for the mentally handicapped child must be organized and taught with the awareness of his particular need to develop independent thinking skills. The

processes involved in scientific learning tend to promote the types of thinking that the child needs to have at his command. These science processes and their inter-relationship to all other areas of the curriculum, will help to better prepare the student vocationally. The concepts used throughout the program should be those which are pertinent to the persisting life needs of the child. These concepts should be taught parallel with, but secondary to, the processes of science in an activity centered curriculum.

Following is a list of ten processes that the workshop committee selected to be emphasized when teaching science units:

1.	Observing:	Power of seeing and noting for some special purpose.
2.	Classifying:	Arrangement in groups according to some selected system.
3.	Communicating:	Transferring information by writing, talking, etc.
4.	Inferring:	Drawing a conclusion based on observation requiring evaluation and judgement.
5.	Measuring:	Determining the extent, size, quantity, capacity, etc., of something, stressing the value of accuracy.
6.	Predicting:	Stating the expected result based on past experience.
7.	Interpreting:	The explanation of gathered information.
8.	Making Operational Definitions:	Putting scientific phenomena or events into terms which the student can comprehend and communicate.
9.	Formulating Questions and Hypotheses:	Seeking of information and the stating of tentative explanations based upon the information obtained.
10.	Experimenting:	A trial made to confirm or disprove something doubtful, to test some suggested truth, or to demonstrate some known truth.

The processes may occur at each of the four levels or pods. However, it is suggested that certain processes be given greatest emphasis as follows; Level I: Observing, classifying, and communicating.

Level II: Inferring and measuring.

Level III: Predicting and interpreting.

Level IV: Making operational definitions, formulating questions and hypotheses, and experimenting.

In an activity centered approach, emphazing direct experiences, the child also has the opportunity for socialization, discussion and the experimentation of his ideas with his peers. As the child's language evolves, he should be able to participate in discussions and more effectively offer his own ideas and observations. Such experiences broaden and improve the child's self-concept. This new sense of self, combined with experience in and knowledge and use of the processes of science should further assist the child in his relationship to his environment.

The child should be encouraged to investigate, discuss and ask questions making the role of the teacher that of a guide. As a guide the teacher must be prepared to organize and lead the child to see the relationships of his findings to their practical application in science and in persisting life situations.

Content introduced at the primary level may reoccur at all of the other levels. This content, when varied, will spiral into all succeeding levels with wider meaningful application and a fresh outlook as opposed to mere dull repetition of concepts presented at earlier levels. The learnings should be structured so that they will relate to the total curriculum and be geared to the child's

interest and future needs. There were four broad areas of study selected by the workshop committee that can be developed into units of work stressing the science processes. These areas include: biological science, physical science, earth science, and general skills. Ecology is an important phase of science and should be emphasized throughout the total science program.

Once the unit has been selected, it is most important that activities be planned that will permit direct student participation in the daily lessons. It should be noted that when students are actively involved in investigation of science processes they will move about, talk to their partners and hopefully become excited about new discoveries. This is not to suggest chaos. The teacher is expected to have control at all times so that each student has the opportunity to benefit from the activity. Some students will need closer supervision and guidance in their daily work.

ESS Units

After a thorough review, select ESS science materials were purchased as being adaptive to meet the needs of the EMH child in relation to the educational philosophy at Riverview School. Because of the flexibility of the ESS units they were not limited to specific pods for use. Teachers were asked to list ESS units they felt they would like to use and for approximately what length of time. Below is a list of the ESS units used thus far this year, the educable pod in which it was used, and a rating from the teachers who used the units.

ESS Units	Junior High C.A. 14-16	Intermediate C.A. 12-13	Upper Primary C.A. 9-11	Lower Primary C.A. 5-8
A. General Skills				
Atribute Games and Problems	Fair			Fair
Geo Blocks		Good		Good
Match & Measure	Good		Excellent	
Musical Recipe Book		Fair		
Pattern Blocks				Fair
Peas & Particles	Excellent			
Primary Balancing				Excellent
Structures	Good	Good		
Tangrams	Excellent	Excellent	Excellent	Excellent
B. Earth Science				
Rocks & Charts	Good			
Sand		Excellent		
C. Biological Science				
Brine Shrimp			Poor	
Changes			Fair	
Crayfish			Excellent	Excellent
Earthworms		Good		
Eggs & Tadpoles			Excellent	
Pond Water		Good		
Small Things	Good			
Tracks		Excellent		

ESS Units	Junior High C.A. 14-16	Intermediate C.A. 12-13	Upper Primary C.A. 9-11	Lower Primary C.A. 5-8
D. Physical Science				
Batteries & Bulbs	Good			
Clay Boats		Excellent		
Colored Solutions			Excellent	
Props, Streams & Containers		Good		
Ice Cubes			Poor	
Kitchen Physics		Good		
Mirror Cards				Good
Mobiles		Good		
Mystery Powders		Excellent	Good	

SCIENCE ADVISORY COMMITTEE

A science advisory committee was established with the writing of the project. The committee was comprised of six members: three parents, who had children at Riverview School; and three educators, two from outside of Riverview and one from Riverview. Following is a list of some of the comments from this committee at a meeting held after the members visited science classes in session at Riverview.

"Students highly motivated by materials and questions presented by the teachers"

"Great deal of potential for vocational education enhancement from the methods being used to teach science"

"Amazed at the similarities of response between the regular and special education students"

"Students were very interested in their work and behavior of students surprisly good"

"Students very well behaved even though they are working in many different areas of the pod"

"This is the way science should be - FUN!!"

"Interaction of students seems to be helping the more withdrawn students become involved."

SUMMARY

In summation, the project has revealed to date that child-centered activities can be used successfully with educable mentally handicapped children. The students have demonstrated a high degree of interest in science when permitted to be active participants.

It has been found that many of the Elementary Science Study Kits can be readily adapted for use with EMH children. A great deal depends on the innovativeness of individual teachers to use open ended materials like ESS. More time will be required in modifying the ESS Kits for the younger EMH child, especially those in the 5-8 year old range.

The cost of materials depends on the units selected, and in many instances the teacher s manual alone can be used to intiate child-centered activities. Regardless of the ESS Kit and its cost, a certain degree of modification and teacher preparation will be necessary to use the kits effectively with EMH children.